



Climate Change Impacts on Vulnerable Communities in Karnataka

M Balasubramanian¹, M Manjunath, OK Remadevi, KH Vinaya Kumar, RK Singh and Ritu Kakkar²

Introduction

Poor and vulnerable groups are more negatively affected by changing climate and its related uncertainties in many developing countries. Agriculture, forestry and fisheries are the major sectors extremely sensitive to climate change even as a majority of the population in developing countries is highly dependent on these sectors for its survival. Climate change has been the prime reason for issues like low access to drinking water, food insecurity and associated health problems. Dietz and Stern (2009) observed that the climate-related events have a high impact on the marginalised population compared to the high income groups in the developing countries. Bridges (2016) found that the Scheduled Caste and indigenous communities are adversely affected due to climate change in India. However, a low number of studies have documented climate change impacts on marginalised groups, for example, in Africa (Boko et al., 2007). In addition, there are other aspects about climate change and inequality in terms of an uneven power structure and distribution of relief material in society. In the above context, at local, national and international levels, it is the vulnerable groups that are the most adversely affected due to climate change. In India, there are no significant studies on vulnerable communities and climate change. The IPCC Fifth Assessment Report has stated that climate change has directly affected the poor and marginalised groups through its impacts on their livelihoods such as losses in crop yields, destroyed homes, food insecurity and indirectly through increased food prices. Therefore, there is a need to assess the impacts of climate change on the livelihoods of vulnerable communities.

Climate change has affected a large number of people, especially socially excluded groups or vulnerable groups³. Olsson et al (2014) comprehensively discussed the impacts of climate change on the marginalised population in developing countries⁴. Most of the developing countries have inadequate adaptation strategies, especially for vulnerable communities. Vulnerable groups are facing two hurdles in this society. First, major environmental problems like pollution, water contamination, improper solid waste disposal, land degradation, forest degradation, and lack of access to natural resources on the one hand are factors that lead to loss of their livelihood because most of them depend on climate sensitive sectors as a major source of their income and employment. On the other hand, they are also hit by low literacy, unemployment, low income and lack of access to energy. In many developing countries, they have no decision-making power in society. Fankhauser and Stern (2016) has noted that climate change exerts uneven impacts across countries and populations at the global level. Moreover, developing countries show less adaptation to climate change and other coping mechanisms for preventing the adverse impacts of climate change. Climate change and its related hazards are having a great impact on the lives and livelihoods of vulnerable communities.

Vulnerable communities have already suffered economic as well as social discrimination. Climate change is also another burden in their lives. The World Bank (2016) expressed the view that the rising temperature, unpredictability over the beginning of the monsoon season has resulted in impacts on some people and communities associated with low

¹ M Balasubramanian, Assistant Professor, Centre for Ecological Economics and Natural Resources, Institute for Social and Economic Change, Bangalore - 72, Email - balasubramanian@isec.ac.in

² M Manjunath, OK Remadevi, KH Vinaya Kumar, RK Singh and Ritu Kakkar, Environmental Management Policy Research Institute, Bangalore. We acknowledge Environmental Management Policy Research Institute, Bangalore for financial support of the project.

³ Vulnerable groups are described by the World Bank (2014) to "include indigenous people and ethnic minorities, migrants workers, women, girls, older people and children" P. XXII

⁴ IPCC Fifth Assessment Report (2014) said "socially and economically disadvantaged and marginalized are disproportionately affected by the impacts of climate change and extreme events" (page 802).

socioeconomic characteristics of the many developing countries. A study by Gentle et al. (2014) shows that climate change related impacts have not been uniform among the people and communities. This study shows that the vulnerability to climate change is determined by a number of socioeconomic characteristics such as household size, quality of farmland, education of the head of the household, access to financial resources and social status within the community. This study found that 81.3 per cent of the respondents reported major damage to their houses, lands or livelihood in Jumla district of Nepal. Hasse and Cotula (2006) observed that in the Sahel region of Africa, all farmers and pastoralists are highly affected due to climate change, and they are the most vulnerable groups. Moreover, they don't have proper adaptation to climate change because of their lack of political power in society.

Vulnerability Index for vulnerable communities in Karnataka

A total number of 305 Scheduled Caste and Scheduled Tribe households were selected for interview using a semi-structured questionnaire to elicit responses from January to March 2017. The study used the random sampling method for assessing the socio-economic and environmental indicators of household information from each chosen village in Karnataka. The questionnaire was divided into the following socio economic and environmental variables comprising age, gender, marital status, educational level, employment status, monthly income, family size and caste of respondents, total land holdings, agricultural production, status of the property, climate change experience, temperature experience, drought and health impacts. There are three different methods for assessing vulnerability to climate change such as socio-economic, biophysical as well as the integrated approach, which unites both socio-economic and biophysical approaches. Opiyo et al. (2014) found the socio-economic approach has focused on the adaptive capacity of individuals or communities based on internal characteristics. The major limitation of this approach is that natural resources do not account for assessing vulnerability to climate change. The second approach, the biophysical approach, is used predominantly for assessing the level of damage and environmental stress caused by the social and biological system. The third, the integrated approach, combines both socio-economic

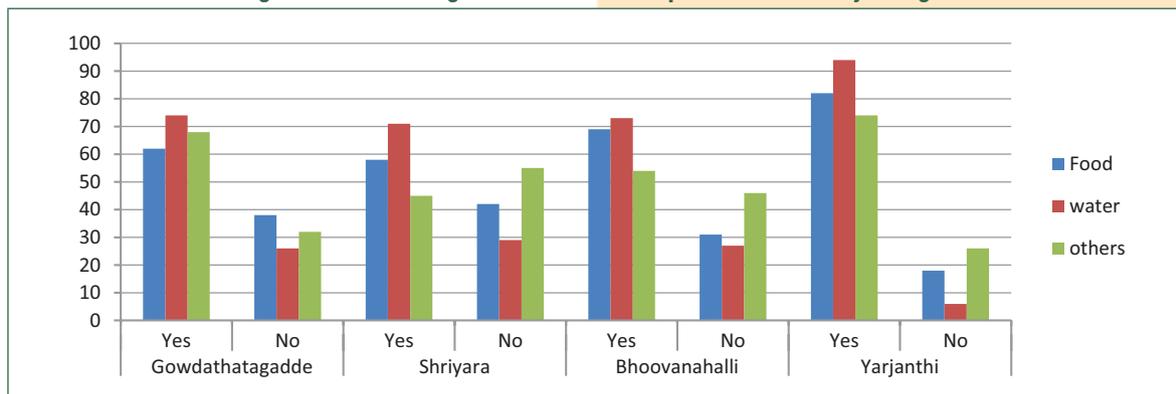
and biophysical approaches for assessing household vulnerability to climate change. IPCC (2012) says vulnerability is seen as the net effect of adaptive capacity (socio-economic) and sensitivity/exposure (biophysical):. According to the IPCC definition of vulnerability and Opiyo et al. (2014) when the adaptive capacity of the household exceeds that of its sensitivity and exposure, the household becomes less vulnerable to climate change impacts and the reverse is also true. Each set of adaptive capacity, sensitivity and exposure is composed of different variables.

Findings of the Study

Fig 1 represents the effects of climate change on livelihoods in the studied villages in Karnataka. The study found that in Shiriyara village, 65 per cent of the households agreed that climate change had adversely affected them in terms of loss of daily employment, reduction of livelihoods and income from the forest. Also, 65 per cent of the household respondents faced water problem in the village. The availability of water resources has declined due to ground water reduction in the study village. Moreover, 21 per cent of the households faced food insecurity. Meanwhile, in Gowdathatagadde, 75 per cent of households faced water insecurity due to decreasing ground water, while 35 per cent of the households were under food security pressure. Most of the households in the village had migrated due to climate related events. More than 70 per cent of the household respondents said lack of water was the major problem for everyday household use and agricultural production. About 68 per cent of the household respondents mentioned food as a major concern at present as well as pointing out that weather changes are the major reason for the unavailability of food for the households. Yarjanthi village was more adversely affected due to climate change than the other studied villages in Karnataka. Fig 5.10 shows that more than 90 per cent of the households here have water insecurity due to various climate related events, particularly prolonged drought, while 82% of the household respondents were not satisfied with the existing food availability at their home. Climate change had caused more food insecurity for the households.

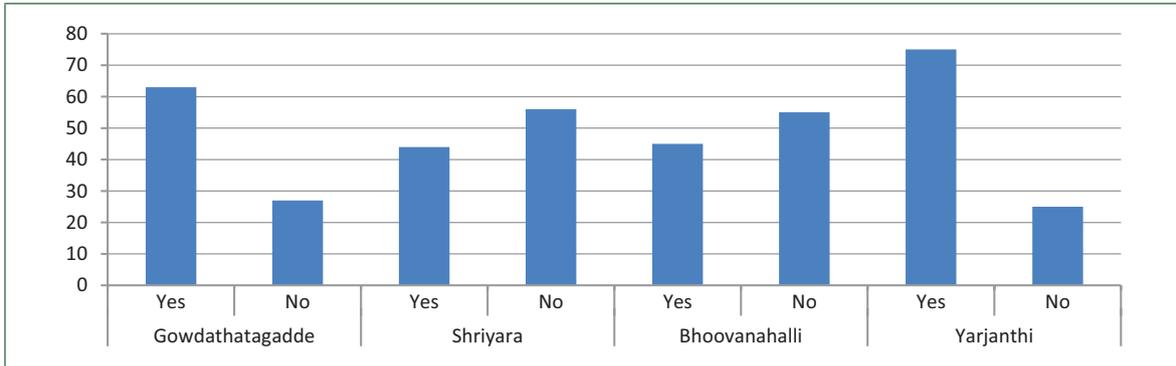
Fig 2 shows the impacts of climate change on the health of the household respondents of the studied villages. In Shiriyara village, 65 per cent of the households agreed that climate change had

Fig 1: Climate Change and Livelihood Impacts on the Study Villages



Source: Author estimates based on the Primary Survey

Fig 2: Climate Change and Health Impacts on the Study Villages

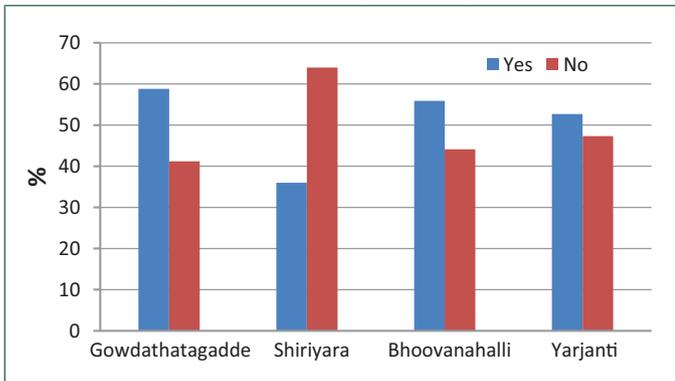


Source: Author estimates based on the Primary Survey

affected their health and 35 per cent of the household respondents disagreed. In Gowdathatagadde village, 35 per cent of the household members agreed that climate change had affected their health and 35 per cent of the household respondents disagreed. In Boovanahalli village, 31 per cent of the households agreed that climate change had affected their health, while 46 per cent of the household respondents disagreed. The other 23 per cent of the household respondents were uncertain about the impact of climate

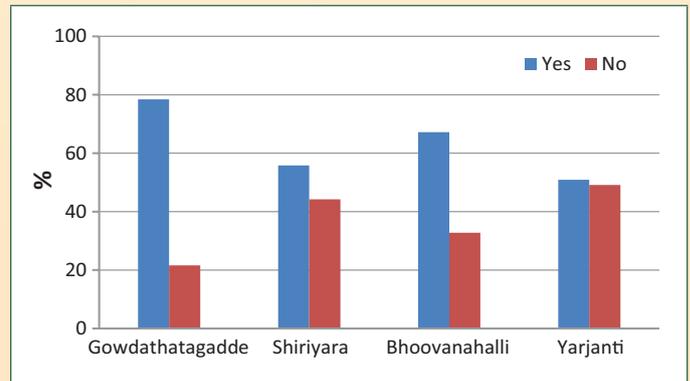
change on their health. Climate change has been one of the reasons for migration in the studied villages in Karnataka. Fig 3 clearly shows that household respondents in Gowdathatagadde, Boovanahalli and Yarjanthi villages have migrated for informal jobs in Bangalore, Mysore and other cities in Karnataka. The study estimates more than 50 per cent of the household heads have migrated from the native places. Climate change is expected to cause increased migration of the people in the future in Karnataka. Fig 4 clearly

Fig 3: Climate Change and Migration



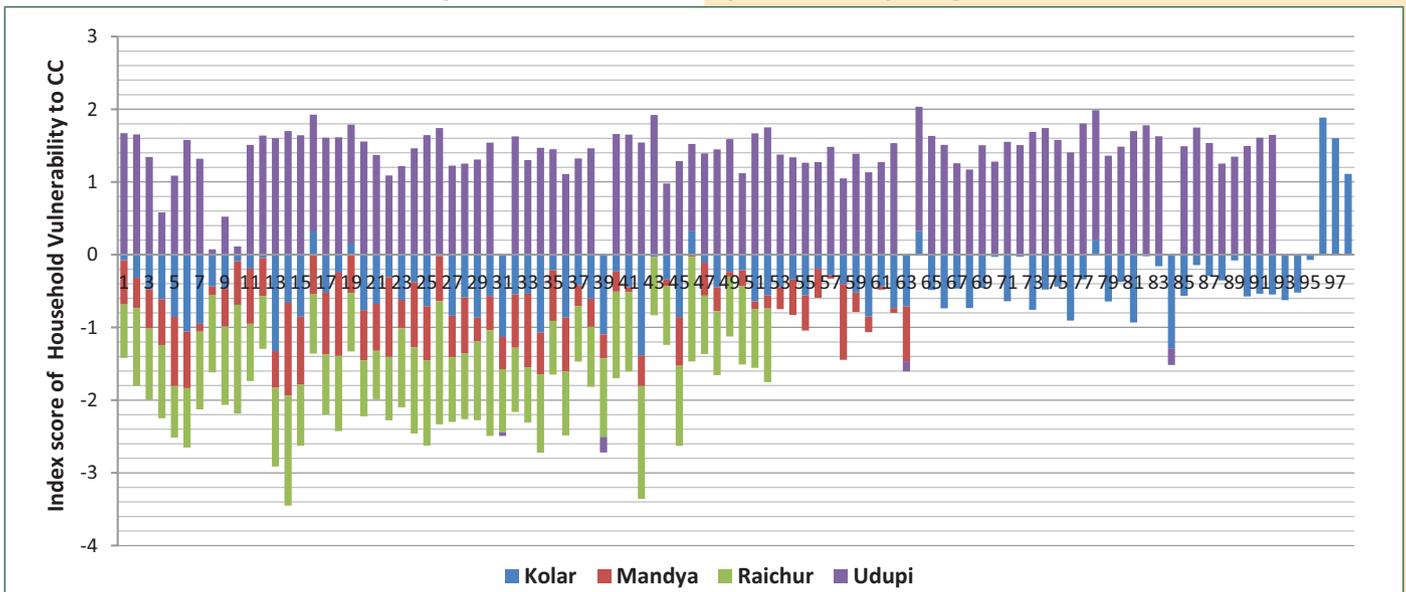
Source: Author estimates based on the Primary Survey

Fig 4: Climate Change and Rise of Food Prices



Source: Author estimates based on the Primary Survey

Fig 5: Household Vulnerability Index of Study Villages



Source: Author estimates based on the Primary Survey

shows that climate change has been one of the major reasons for increase in food prices. A total 78 per cent of Gowdathatagadde village respondents revealed that food prices have increased due to climate-related events such as drought and prolonged drought. Moreover, Boovanahalli and Yarjanthi village respondents have faced the same problem due to climate change.

Fig 5 shows the household vulnerability of vulnerable groups in four study villages in Karnataka. This figure shows three types of vulnerabilities - high, moderate and low. Highly vulnerable households are those for whom the difference between adaptive capacity and sensitivity/exposure is significantly negative. Yarjanthi (Raichur district) is highly vulnerable followed by Boovanahalli (Mandya district), because the two districts are highly drought affected areas compared to other districts of Karnataka. Second, moderately vulnerable, which means households for whom the difference between adaptive capacity and exposure/sensitivity is nearly zero. Fig 5 shows that Gowdathatagadde (Kolar district) is moderately vulnerable in Karnataka. Third, less vulnerable, which means that the difference between adaptive capacity, exposure/sensitivity is significantly positive. Shiriyara (Udupi district) is less vulnerable among the four study villages in Karnataka. This study found that out of 305 households, only 11 households are moderately vulnerable to climate change. This figure clearly shows that 208 households are highly vulnerable and 86 households are less vulnerable among the study villages in Karnataka.

Policy Suggestions

Most of the climate change vulnerability assessment has paid attention to changes at national or various sector levels. Therefore, these kinds of assessment are useful when comparing the country level climate change impact, but are not of much help to decision makers at the local level. This study shows the vulnerability to climate change impacts among communities at the village level in Karnataka. In addition, most of the adaptation programmes are at the local level without assessing the various communities. For example, a large number of studies focused on agriculture impacts, forest and biodiversity. Vulnerability assessment plays a vital role for climate financing, especially for adaptation to climate change at the various social categories.

This study has suggested some points for reducing the adverse impact of climate change on vulnerable communities as well as improving adaptation to climate change programmes for various communities. They are:

- A more proper assessment of the costs of climate change on vulnerable communities at the local and national level;

- Equal resource allocation to every affected community in society;
- Improving rights of access to natural resources;
- Strengthening, integrating and implementing traditional knowledge for adapting to climate change;
- Investment in education and health for those who are highly affected due to climate change;
- Creating more employment opportunities in forestry and mining related sectors;
- Representatives need to participate in climate-related policy decisions at the local and national level. Climate change is one of the tools for improving the income and wealth of the poor and vulnerable communities.

References

- Bridges, K., 2016. Climate Change, Scheduled Castes, and Scheduled Tribes: Analyzing Socioeconomic and Climate Change Vulnerabilities Amongst Female Farmers in Rural Madhya Pradesh. *In Situ*, 5(1), p.3.
- Boko, M., Niang, I., Nyong, A., Vogel, C., Githeko, A., Medany, M., Osman-Elasha, B., Tabo and R., Yanda, P.(2007). In Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., Hanson, C.E. (Eds.), *Africa. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of working group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge UK, pp. 433–467.
- Dietz, S. and Stern, N., 2009. Note—on the timing of greenhouse gas emissions reductions: a final rejoinder to the symposium on “the economics of climate change: the stern review and its critics”. *Review of Environmental Economics and Policy*, 3(1), pp.138-140.
- Fankhauser, S. and Stern, N., 2016. Climate change, development, poverty and economics. *The State of Economics, the State of the World*.
- Gentle, P., R. Thwaites, D. Race, and K. Alexander(2014). Differential impacts of climate change on communities in the Middle Hills region of Nepal. *Natural Hazards* 74: 815–36.
- IPCC, 2012a: Summary for Policymakers. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, 19 pp
- Opiyo, F.E., Wasonga, O.V. and Nyangito, M.M. (2014). Measuring household vulnerability to climate-induced stresses in pastoral rangelands of Kenya: Implications for resilience programming. *Pastoralism*, 4(1), pp.1-15.
- Olsson, L., Opondo, M., Tschakert, P., Agrawal, A. and Eriksen, S.E., 2014. *Livelihoods and poverty*.
- World Bank, 2016. *World Bank Group Climate Change Action Plan*.

Institute for Social and Economic Change

Dr. V K R V Rao Road, Nagarabhavi PO, Bangalore 560072

Phone: 23215468, 23215519, Fax: +91-80-23217008; Web: <http://www.isec.ac.in>